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10/722,597

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Osamu Suzuki

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12/15/2008

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EXAMINER

LEWIS, MONICA

ART UNIT

PAPER NUMBER

2894

MAIL DATE

DELIVERY MODE

12/15/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/722,597

Applicant(s)

SUZUKI ET AL.

Examiner

Monica Lewis

Art Unit

2894

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 October 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-14 and 21-24 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 4-14 and 21-24 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 28 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/808)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

1. This office action is in response to the amendment filed October 2, 2008.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claims 4, 22 and 23 are objected to because of the following informalities: a) it appears that there are too many commas being utilized in the heat transfer paragraph. It is very confusing to read. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-14 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) "a heat transfer layer, connected with the plate-like semiconductor chip in one body, being formed on another, opposing surface side of the plate like semiconductor chip, and which forms between said another, opposing surface side of the plate-like semiconductor chip and one surface side of said heat transfer layer opposing thereto" (See Claims 4 and 22); and b) "said heat transfer forming between said another, opposing surface side of the plate-like semiconductor chip and one surface side of said of said heat transfer layer opposing thereto" (See Claims 14 and 23). It

is not clear what is formed between the opposing surface side of the chip and the surface side of the heat transfer layer (See Claims 4 and 22). Additionally, it is not clear how the heat transfer layer can be between the chip and itself (See Claim 14 and 23). Claims 5-13, 21 and 24 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4-9, 11, 12, 14 and 21-24, as far as understood, are rejected under 35

U.S.C. 103(a) as obvious over Zuo (U.S. Patent No. 6,631,077) in view of *Microchip*

Fabrication by Peter Van Zant and Ohashi et al. (Japanese Publication No. 07-286788).

In regards to claim 4, Zuo discloses the following:

a) a circuit forming layer being formed on one side surface of the plate-like semiconductor chip (160) (For Example: See Figure 1); and

b) a heat transfer layer (110), connected with the plate-like semiconductor chip in one body, being formed on another, opposing surface side of the plate like semiconductor chip and which forms between said another, opposing surface side of the plate-like semiconductor chip and one surface side of said heat transfer layer opposing thereto, a closed flow passage (120), an operating fluid (122) hermetically enclosed within said closed flow passage, wherein said heat transfer layer is made of a material similar to that of said semiconductor chip and wherein the vibration giving means includes a resistor layer (111), positioned outside the closed flow passages of said operating fluid, which enables formation of bubbles in the operating fluid (For Example: See Figure 1, Column 1 Line 14 and Column 4 Lines 43-54 and Column 5 Lines 19-35).

In regards to claim 4, Zuo fails to disclose the following:

a) a plural number of circuits.

However, Van Zant discloses the use of logic and memory elements in a circuit (For Example: See Page 543). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of logic and memory elements as disclosed in Van Zant because it is well known that every integrated circuit contains both logic and memory sections (For Example: See Page 543).

Additionally, since Zuo and Van Zant are both from the same field of endeavor (semiconductor), the purpose disclosed by Van Zant would have been recognized in the pertinent art of Zuo.

b) driving means of said operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid.

However, Ohashi et al. ("Ohashi") discloses the use of a driving means of operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of a driving means of operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid as disclosed in Ohashi because it aids in providing control of the heat transporting capacity (For Example: See Abstract).

Additionally, since Zuo and Ohashi are both from the same field of endeavor (semiconductor), the purpose disclosed by Ohashi would have been recognized in the pertinent art of Zuo.

In regards to claim 5, Zuo discloses the following:

a) the resistor layer is disposed in a region where heat generation density is lower than an average of heat generation density of said integrated circuit chip as a whole (For Example: See Figure 1).

In regards to claim 6, Zuo discloses the following:

a) operating fluid is water (For Example: See Table 1).

In regards to claim 7, Zuo fails to disclose the following:

a) plate-like semiconductor chip includes logic elements and memory elements are formed separately within said one side surface thereof.

However, Van Zant discloses the use of logic and memory elements (For Example: See Page 543). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of logic and memory elements as disclosed in Van Zant because it is well known that every integrated circuit both logic and memory sections (For Example: See Page 543).

Additionally, since Zuo and Van Zant are both from the same field of endeavor (semiconductor), the purpose disclosed by Van Zant would have been recognized in the pertinent art of Zuo.

In regards to claim 8, Zuo discloses the following:

a) the closed flow passage in said heat transfer layer is configured as a plurality of closed flow passages at said another surface side of said semiconductor chip (For Example: See Figure 1).

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In regards to claim 9, Zuo discloses the following:

a) each of said the plurality of closed flow passages has a separate means for driving the operating fluid enclosed within an inside thereof (For Example: See Figure 1)(Note: Applicant discloses that the resistor layer is the heating/driving means (See Specification Page 20 Lines 1 and 2)).

In regards to claim 11, Zuo discloses the following:

a) another closed flow passage (140) which is formed at a same surface side of said semiconductor chip as said plurality of closed flow passages and crossing over said plurality of closed flow passages (For Example: See Figure 1).

In regards to claim 12, Zuo discloses the following:

a) each of said plurality of closed flow passages has a separate said means for driving the operating fluid enclosed within an inside thereof (For Example: See Figure 1)(Note: Applicant discloses that the resistor layer is the heating/driving means (See Specification Page 20 Lines 1 and 2)).

In regards to claim 14, Zuo discloses the following:

a) a plate-like semiconductor chip (For Example: See Figure 1);

b) a circuit forming layer being formed on one surface side surface of said plate-like semiconductor chip (For Example: See Figure 1); and

c) a heat transfer layer, being formed on another surface side of the plate like semiconductor chip, opposite to the surface side on which said circuit forming layer is formed and connected therewith in one body, for suppressing a local increase in temperature caused by heat generation of the circuits within said circuit forming layer of said semiconductor chip wherein said heat transfer layer forming between said another opposing surface side of the plate-like semiconductor chip and one surface side of said heat transfer layer opposing thereto comprises a closed flow passage, an operating fluid hermetically enclosed within said closed flow passage and wherein said heat transfer layer is made of a material similar to that of said semiconductor chip and wherein the vibration giving means includes a resistor layer, positioned outside the closed flow passage of said operating fluid which enables formation of bubbles in the operating fluids (For Example: See Figure 1, Column 1 Line 14 and Column 4 Lines 43-54 and Column 5 Lines 19-35).

In regards to claim 14, Zuo fails to disclose the following:

a) a plural number of circuits.

However, Van Zant discloses the use of logic and memory elements in a circuit (For Example: See Page 543). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of logic and memory elements as disclosed in Van Zant because it is well known that every integrated circuit contains both logic and memory sections (For Example: See Page 543).

Additionally, since Zuo and Van Zant are both from the same field of endeavor (semiconductor), the purpose disclosed by Van Zant would have been recognized in the pertinent art of Zuo.

b) driving means of said operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid.

However, Ohashi discloses the use of a driving means of operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of a driving means of operating fluid wherein said driving means of the operating fluid is made of electrically operated means for giving to the hermetically enclosed operating fluid as disclosed in Ohashi because it aids in providing control of the heat transporting capacity (For Example: See Abstract).

Additionally, since Zuo and Ohashi are both from the same field of endeavor (semiconductor), the purpose disclosed by Ohashi would have been recognized in the pertinent art of Zuo.

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In regards to claims 21 and 24, Zuo discloses the following:

a) both said plate like semiconductor chip and said heat transfer layer are made of a material of silicon (For Example: See Column 1 Line 14 and Column 4 Lines 43-54).

In regards to claim 22, Zuo discloses the following:

a) a circuit forming layer being formed on one side surface of the plate-like semiconductor chip (160) (For Example: See Figure 1); and

b) a heat transfer layer (110), connected with the plate-like semiconductor chip in one body, being formed on another, opposing surface side of the plate like semiconductor chip and which forms between said another, opposing surface side of the plate-like semiconductor chip and one surface side of said heat transfer layer opposing thereto, a closed flow passage (120), an operating fluid (122) hermetically enclosed within said closed flow passage, wherein said heat transfer layer is made of a material similar to that of said semiconductor chip (For Example: See Figure 1, Column 1 Line 14 and Column 4 Lines 43-54 and Column 5 Lines 19-35).

In regards to claim 22, Zuo fails to disclose the following:

a) a plural number of circuits.

However, Van Zant discloses the use of logic and memory elements in a circuit (For Example: See Page 543). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of logic and memory elements as disclosed in Van Zant because it is well known that every integrated circuit contains both logic and memory sections (For Example: See Page 543).

Additionally, since Zuo and Van Zant are both from the same field of endeavor (semiconductor), the purpose disclosed by Van Zant would have been recognized in the pertinent art of Zuo.

b) driving means of said operating fluid.

However, Ohashi discloses the use of a driving means of operating fluid (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the

invention was made to modify the semiconductor device of Zuo to include the use of a driving means of operating fluid as disclosed in Ohashi because it aids in providing control of the heat transporting capacity (For Example: See Abstract).

Additionally, since Zuo and Ohashi are both from the same field of endeavor (semiconductor), the purpose disclosed by Ohashi would have been recognized in the pertinent art of Zuo.

In regards to claim 23, Zuo discloses the following:

- a) a plate-like semiconductor chip (For Example: See Figure 1);
- b) a circuit forming layer being formed on one surface side surface of said plate-like semiconductor chip (For Example: See Figure 1); and
- c) a heat transfer layer, being formed on another surface side of the plate like semiconductor chip, opposite to the surface side on which said circuit forming layer is formed and connected therewith in one body, for suppressing a local increase in temperature caused by heat generation of the circuits within said circuit forming layer of said semiconductor chip wherein said heat transfer layer forming between said another opposing surface side of the plate-like semiconductor chip and one surface side of said heat transfer layer opposing thereto comprises a closed flow passage, an operating fluid hermetically enclosed within said closed flow passage and wherein said heat transfer layer is made of a material similar to that of said semiconductor chip (For Example: See Figure 1, Column 1 Line 14 and Column 4 Lines 43-54 and Column 5 Lines 19-35).

In regards to claim 23, Zuo fails to disclose the following:

- a) a plural number of circuits.

However, Van Zant discloses the use of logic and memory elements in a circuit (For Example: See Page 543). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of logic and memory elements as disclosed in Van Zant because it is well known that every integrated circuit contains both logic and memory sections (For Example: See Page 543).

Additionally, since Zuo and Van Zant are both from the same field of endeavor (semiconductor), the purpose disclosed by Van Zant would have been recognized in the pertinent art of Zuo.

b) driving means of hermetically enclosed operating fluid.

However, Ohashi discloses the use of a driving means of hermetically enclosed operating fluid (For Example: See Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of a driving means of hermetically enclosed operating fluid as disclosed in Ohashi because it aids in providing control of the heat transporting capacity (For Example: See Abstract).

Additionally, since Zuo and Ohashi are both from the same field of endeavor (semiconductor), the purpose disclosed by Ohashi would have been recognized in the pertinent art of Zuo.

8. Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as obvious over Zuo (U.S. Patent No. 6,631,077) in view of *Microchip Fabrication* by Peter Van Zant, Ohashi et al. (Japanese Publication No. 07-286788) and O'Connor et al. (U.S. Publication No. 2002/0039280).

In regards to claim 10, Zuo fails to disclose the following:

a) a plurality number of temperature detecting means which are provided within said semiconductor chip, wherein the plural driving means which provided for the plural closed flow passages, respectively are controlled in dependence on temperature detection outputs from said temperature detecting means.

However, O'Connor et al. ("O'Connor") discloses the use of temperature detection means (For Example: See Page 8-Claim 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to

include the use of temperature detecting means as disclosed in O'Connor because it aids in providing a means to allow the device to be cooled (For Example: See Abstract).

Additionally, since Zuo and O'Connor are both from the same field of endeavor (semiconductor), the purpose disclosed by O'Connor would have been recognized in the pertinent art of Zuo.

In regards to claim 13, Zuo fails to disclose the following:

a) a plurality number of temperature detecting means which are provided within said semiconductor chip, wherein the plural driving means which provided for the plural closed flow passages, respectively are controlled in dependence on temperature detection outputs from said temperature detecting means.

However, O'Connor discloses the use of temperature detection means (For Example: See Page 8-Claim 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Zuo to include the use of temperature detecting means as disclosed in O'Connor because it aids in providing a means to allow the device to be cooled (For Example: See Abstract).

Additionally, since Zuo and O'Connor are both from the same field of endeavor (semiconductor), the purpose disclosed by O'Connor would have been recognized in the pertinent art of Zuo.

Response to Arguments

9. Applicant's arguments filed 10/2/08 have been fully considered but they are not persuasive. Applicant argued that the prior art failed to disclose **"the closed flow passage within which fluid is hermetically enclosed is formed between the surface side of the semiconductor chip, opposite the side thereof on which the circuits are formed, and the surface side of the**

heat transfer layer facing in an opposite direction.” However, the Applicant is arguing limitations that are not disclosed in the claims.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly Nguyen can be reached on 571-272-2402. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300 for regular and after final communications.

/Monica Lewis/
Primary Examiner, Art Unit 2894

December 13, 2008